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THE TEACHING OF AGRICULTURE
IN THE PUBLIC SCHOOLS.

BY C. C. JAMES, M.A., DEPUTY MINISTER OF AGRICULTURE.

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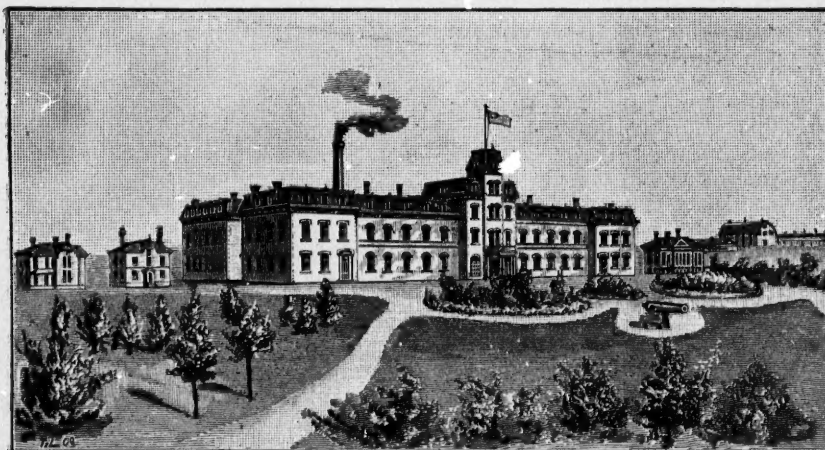
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THE TEACHING OF AGRICULTURE IN THE PUBLIC SCHOOLS.

BY C. C. JAMES, M.A., DEPUTY MINISTER OF AGRICULTURE.

It seems at first thought impossible to believe that before the nineteenth century dawned Agricultural Science was to even the most advanced scientific workers and explorers a "dark continent." In 1804 De Saussure published a work entitled "Recherches sur la Végétation," in which he gave the analyses of the ashes of many plants, and contended that they were absolutely essential to the growth of the plant, that they must be derived from the soil, and that probably these ash or mineral constituents that the plant derived from the soil were the source of those found in the animals which fed upon the plants. From 1802 to 1812 Sir Humphrey Davy delivered several series of lectures which he published in 1813 under the title "Elements of Agricultural Chemistry." To him is due the credit of making the first attempt to reduce agricultural knowledge and investigation to a scientific basis. The work of these two men, together with that of Thaer, Sprengel and Boussingault, prepared the way for the magnificent work of Liebig, whose publications appeared in 1840 and 1842, since which time many of the brightest minds in Europe and America have been investigating the composition of soil, plant and animal, and their relation to one another.

Davy said: "Discoveries made in the cultivation of the earth are not merely for the time and country in which they are developed but they may be considered as extending to future ages, and as ultimately tending to benefit the whole race, as affording subsistence for generations to come; as multiplying life; and not only multiplying life, but likewise providing for its enjoyment."

Liebig in one of his productions wrote: "I shall be happy if I succeed in attracting the attention of men of science to subjects which so well merit to engage their talents and energies. Perfect agriculture is the true foundation of trade and industry—it is the foundation of the riches of states."

Without further introduction I shall proceed to discuss the subject under the following heads:

- I. *Should Agriculture be taught in our Public Schools?*
- II. *Can Agriculture be taught in our Public Schools?*
- III. *How can Agriculture be taught in our Public Schools?*

I. SHOULD AGRICULTURE BE TAUGHT ?

(1) It should, because of the number of people engaged in and dependent upon it. Two-thirds of the people of Canada are either residing in the country and obtaining their living directly from the soil, or are so intimately associated with the rural districts (living in small villages) that they may be termed rural. Sixty per cent of the assessed population reside in the townships and 69 per cent. of the Public School population belong to the rural districts, as will be seen from the following statements :

Public Schools, 1890.	Total school population.	Pupils registered.	Average attendance.
Townships and villages	424,657	347,783	161,620
Cities and towns	193,199	148,682	88,689
Total	617,856	496,465	250,307

Assessed population.	1882.	1890.
Townships	1,120,574	1,120,106
Cities, towns and villages	575,912	799,299

In connection with this study of the rural population we must also consider a movement which is now causing a very marked change in the social and political life of many nations.

We are all familiar with the great movements of population city-wards, the congestion of national life blood which has created disease in the body politic of European countries. The farmers' sons and daughters are drawn or impelled towards the great commercial centres at an ever increasing rate. Tennyson has referred to this impulse in "Lockesly Hall":

"Yearning for the large excitement that the coming years would yield;
Eager-hearted as a boy when first he leaves his father's field."

The introduction of labor-saving machinery, the greater opportunities of the cities for the acquisition of wealth, social pleasures, public offices and political preferments—all these have been advanced as reasons. Others have put it down to education; in which case the educational systems of the entire civilized world must be more or less at fault. The systems of education may not be the direct cause, but perhaps something may be done through them to check the great movement to the cities. How has Canada fared in this regard?

Bulletin No. 1 of the Census of Canada, 1891, gave on page 5 a comparison of the *urban* population with that of 1881, and comments were made upon the city growth of Canada in the decade.

In this consideration of our subject, however, the rural population is concerned, and I have therefore used the figures given in that Census Bulletin, and worked out the following statements as to the changes that have taken place in the rural population of Canada since 1881 :

Statement of Urban and Rural Population, 1881 and 1891.

	1881.	1891.	Decrease.	Increase.	Per cent.
<i>Urban.</i>					
Ontario	512,549	705,065		192,516	37.56
Quebec	331,756	436,693		104,937	31.63
Nova Scotia	75,323	97,261		21,938	29.13
New Brunswick	59,092	62,562		3,470	5.87
P. E. Island	14,338	14,257	81		0.57
British Columbia	9,070	41,762		32,692	360.4
Manitoba	7,985	32,783		24,798	310.4
N. W. T., etc		3,876		3,876	
Total Urban	1,010,113	1,394,259		384,146	38.10
<i>Rural.</i>					
Ontario	1,414,373	1,407,924	6,449		0.46
Quebec	1,027,271	1,051,893		24,622	2.39
Nova Scotia	365,249	353,262	11,987		3.28
New Brunswick	262,141	258,732	3,409		1.30
P. E. Island	94,553	94,831		278	0.29
British Columbia	40,389	51,005		10,616	26.28
Manitoba	54,275	121,659		67,384	124.15
N. W. T., etc	56,444	95,846		39,400	69.80
Total Rural	3,314,697	3,435,152		120,455	3.63
Grand Total	4,324,810	4,829,411		504,601	11.66

In the preceding table I have given the rural population every advantage, and have considered the case in the same manner as was done in the Census Bulletin cited, which says: "The urban population of Canada is now 1,394,259—an increase of 384,146 souls, equal to an increase of 38.1 per cent." Every place over 1,500 is included in the urban in 1891, and all of the same places are in the urban in 1881, no matter how small. In 1881, of these towns and villages there were 31 having less than 1,500 and a total of 36,551, which in reality were then in the rural but are here included in the urban; in Ontario there were 15 of less than 1,500 each and having a total of 18,162 included in the urban of 1881. The increase of 6,449 in Ontario is therefore the least that can be given.

Leaving aside the question of natural increase, the following

statement will show the wonderful movement which has set in from country and villages and small towns to the larger cities :

2 cities have increased by.....	146,437
13 cities have increased by.....	108,400
147 towns have increased by.....	134,297
21 towns have <i>decreased</i> by	4,988
The rural parts have increased by	120,455
<hr/>	
The Dominion has increased by	504,601

According to the Ontario Immigration Report 1891, there were settled in Ontario from 1881 to 1890 persons to the number of 271,562, as follows: through the agencies at Ottawa, Kingston, Toronto, Hamilton and London, 186,649; reported by Customs, 84,913. If we include their natural increase the number added in the decade by this means will be about 292,000. It is fair to assume that 150,000 at least of these should belong to the rural population. The rural population, therefore, should have been made up as follows in 1891 :

Rural population of 1881	1,414,373
Natural increase (15 per cent)	212,156
Immigration	150,000
<hr/>	
	1,776,529
Census return, 1891	1,407,924
<hr/>	
Loss in Ontario rural population..	368,605

In England and Wales the percentage of the rural population has been as follows: 37.7 in 1861, 35.2 in 1871, 33.4 in 1881, and 28.3 in 1891. Scotland had a total increase from 1881 to 1891, of 297,530, made up as follows: 178,338 increase in the principal town districts; 79,736 increase in the large town districts; 49,492 in the small town districts; 5,592 decrease in the Midland rural districts, and 4,444 decrease in the insular rural districts.

In France, according to the Statesman's Year Book, the rural population decreased from 75.58 per cent. in 1846 to 64.05 per cent. in 1886. "In 1881 of the total increase of 766,260, more than two-thirds, or 561,869, belonged to the 47 towns of more than 30,000 inhabitants." Mulhall gives the number of agricultural hands employed as follows: 6,950,000 in 1840 and 6,450,000 in 1887, with the production per hand as £39 and £71 in the two periods.

In Sweden the rural population dropped from 89.9 per cent. in 1850 to 81.9 per cent. in 1888.

A report of U. S. Consul Ryder, dated Copenhagen, November 9, 1890, gives further information on this point. After stating that in Denmark the rural population decreased from 79.7 per cent. in 1840, to 77.6 in 1860, to 73.8 in 1880, and to 69.5 in 1890, he says: "In the last ten years 137,000 inhabitants have taken their depar-

ture from the rural districts, 64,000 of whom have been received by the towns, the remaining 73,000 having emigrated to foreign lands."

Further on he says: "In France, where the population has for some years been nearly stationary, the towns have been largely increasing their numbers at the expense of the country. In Germany during the five years 1880-85 the rural population has been decreased by 150,000, while the towns have met with an increase of 1,500,000 inhabitants. In towns over 2,000 inhabitants, according to the last census returns, in the Netherlands there were dwelling 80 per cent. of the population; in Belgium, 64 per cent.; in Great Britain and Ireland, 45 per cent.; in Spain and Italy, 43 per cent.; in Germany, 40 per cent.; in France, 30 per cent. A transition from country to town life, as substantiated by these figures, must naturally affect the social physiognomy of a nation. It is a transition from regular and healthful labor under tranquil conditions to the specialties of factory life, with its crises, strikes, etc., and the attendant restlessness of town life. The hands who direct their steps toward the towns are also, for the most part, individuals in the most robust and energetic stage of life, it being found that the class from twenty to forty years of age is much more numerous in the towns than in the rural districts, where, on the other hand, the predominating classes are those of the earliest and latest stages of life."

Further we might add that the British Census of 1890 shows that in towns and cities those of rural birth are to be found in the well-to-do sections, while the majority of paupers are of city birth.

In the United States the urban population includes all persons in towns and cities over 8,000. On that basis the rural population has formed the following percentage of the total population: 96.65 per cent. in 1790; 95.07 in 1820; 93.28 in 1830; 91.48 in 1840; 87.51 in 1850; 83.87 in 1860; 79.07 in 1870; 77.43 in 1880; and 70.88 in 1890. Taking the same basis of division the change in Canada would be from 86.7 p. c. in 1881 to 81.0 p. c. in 1891.

We see, therefore, that Canada in common with other countries has not been gaining in her rural population as she has in her urban. This is a subject for serious consideration in a new country with boundless fertile lands, to which immigration is directed, and which is first and foremost an agricultural country.

(2) Instruction in agriculture should be given because of the large amount of capital invested in it, the wealth annually produced by it and the large share it contributes to our trade and commerce.

The assessment of real estate in townships and in cities and towns shows largely in favor of the rural districts. At the same time it should be remembered that city and town property is likely to be assessed at a higher percentage of its real value than is rural property. The value of farm property for 1887 was \$975,292,214

according to the Bureau of Industries. I next give the figures returned by the municipalities as the assessment of their real estate :

Real estate assessments.	1864.	1887.
Townships	\$195,477,577	\$428,614,636
Cities and towns	43,586,389	223,853,879

Census Bulletin No. 10, June 1892, deals with manufactures, and states the capital invested in such in Canada to be \$353,836,817, the number of employees 367,865, the value of products \$475,445,705. According to the investigation of the Bureau of Industries the capital invested in agriculture in Ontario—in lands, buildings, implements and stock—is \$971,886,068, in round numbers, *one thousand million dollars*, or five and a half times the capital invested in manufactures in Ontario, and three times the capital invested in manufactures in the whole Dominion.

Let us compare the agricultural industry of Ontario with the manufacturing industries of Canada and of Ontario :

	Manufactures.		Agriculture,
	Canada.	Ontario.	Ontario.
Capital invested.....	\$353,836,817	\$176,603,339	\$971,886,068
Number of employees.....	367,865	165,326	300,000
Wages paid	99,762,441	49,207,710	95,000,000
Cost of raw materials.....	255,983,219	128,201,318	80,000,000
Value of products	475,445,705	240,100,267	260,000,000

The manufactures of Canada are greatly dependent upon agriculture both for a market and for sources of supply. From the list of manufacturing establishments in Ontario most directly connected with agriculture I take the following (Census Bulletin No. 8) :

Industry.	Value of machinery and tools.	Number of employees.
Agricultural implements.....	\$ 730,285	3,373
Blacksmithing.....	582,894	5,321
Carriage making.....	637,081	5,096
Harness and saddlery.....	136,582	1,850
Cooperage.....	148,712	1,660
Woollen mills.....	2,189,705	5,174
Meat curing.....	125,401	947
Creameries.....	33,347	132
Cheese factories.....	485,523	1,922
Flour and grist mills.....	4,451,024	3,442
Other vegetable food manufactures.....	600,167	5,959
Breweries and distilleries, malting.....	880,605	1,470
Tanneries, tallow, glue, soap factories.....	357,129	1,922
Saw, planing, paper mills.....	6,608,046	26,527
Total manufactures of Ontario.....	\$18,026,501 38,295,158	64,795 165,335

The more carefully we study the above figures and the statistics given in the Census bulletins on manufactures, the more will we be convinced that success in agriculture underlies success in manufacture, in trade and commerce. The agricultural classes supply a large portion of the raw material for manufactures, and the same classes are large purchasers of the output of these same manufacturing establishments. The farm products of Ontario, aggregating \$260,000,000, are made up as follows: Field products, \$150,000,000; live stock increase, \$35,000,000; dairy products, \$35,000,000; orchard and garden products, \$12,000,000; farm woodland products, \$20,000,000; pasture, \$4,500,000; eggs, wool, honey, sugar, hops, flax, tobacco, etc., \$3,500,000. The total agricultural produce of Canada may be roughly estimated at \$500,000,000. With this contrast the mineral production of Canada, which is about \$20,000,000, and the fisheries production amounting to about \$19,000,000.

Reference has sometimes been made to the statement that the output of the manufactures of Canada equals the total produce of our agriculture, and, therefore, the inference is drawn that our manufactures are as important as our agriculture; but a careful consideration will show that the inference is not fairly drawn. The total product of our manufactures represents the same raw material counted in twice, three times, and in some cases four times, and in many cases the product of the agriculturist is the raw material of the manufacturer. The farmer produces say \$1,000 worth of wheat, which the miller turns into \$1,200 worth of flour, and the baker into \$1,400 worth of bread. The farmer has added to the wealth of the country almost the entire \$1,000; whereas the miller and baker combined have added, not \$2,600, but only \$400. If we compared total products we would compare the \$1,000 worth of wheat with the \$2,600 worth of flour and bread. The wool which the farmer produces reappears in the product of the woollen mill, the tweed manufactory and the tailor shop; the load of oak logs may go through the saw mill, the planing mill, the cabinet shop; the load of basswood may pass through the paper mill and the printing establishment. Taking the value of the raw materials from the total product we find the following to be the amounts of wealth added yearly: By the manufactures of Canada, \$220,000,000; by the manufactures of Ontario, \$110,000,000; by the agriculture of Ontario, \$180,000,000. That agriculture is not so remunerative as it should be, in comparison with other work, is seen at once, from the fact that while there is nearly six times as much capital invested in it as in manufactures in Ontario, and it pays double the wages, it does not add to the wealth of the province double that added by manufactures. Some might say that the profits of agriculture are not large enough.

It is difficult to determine accurately the value of agricultural products in Ontario, but the above will be found to be not very far astray. The following may be used as a basis of estimate :

Farm Lands of Ontario 1891.

	acres.
Pasture lands	2,721,281
Staple field crops	7,834,213
Orchard, garden, etc	446,993
Buildings, lanes, etc	800,000
Total cleared	11,802,457
“ woodland	8,376,762
swamp and waste	2,356,734
Total assessed	22,535,982

In dairying alone, *i.e.* in the production of milk, butter and cheese, there is invested in Ontario at least \$175,000,000, or as much as in all the manufactures of the province. The figures show conclusively that according to the number of persons engaged in and directly dependent upon agriculture, the capital invested in it and the wealth added to the country every year, agriculture stands away above every other industry in importance, and anything done to develop agriculture, to help those now engaged in it, or those who are soon to engage in it, should receive every encouragement. There certainly is a possibility of enormous development in various lines of crop production, as a comparison with many old countries such as England, France and Germany will prove.

The domestic exports of Canada represent the surplus production of the country. For 1891 they were as follows from Canada and also from the United States :

	Canada.		United States.	
	\$	p. c.	\$	p. c.
Produce of the mine	5,782,424	6.8	22,054,970	2.53
“ “ fisheries	9,715,401	11.3	6,208,577	0.71
“ “ forest	5,434,912	6.3	29,473,024	3.29
Timber, planks, boards, etc ..	19,932,874	23.3	5,987,322	19.37
Other manufactures	5,212,197	6.0	162,939,993	
Animals and their products ..	25,967,741	46.2	177,517,383	73.69
Farm produce, grain, etc	13,666,858		465,233,961	
Other products	45,337	0.1	3,612,364	0.41
Total	\$35,575,744	.....	\$872,270,283	.....
Population	4,829,411	.....	62,622,250	.....

Omitting, therefore, all the timber and lumber which has come from the woodland of the farms, we find that over 46 per cent. of the surplus produce of Canada comes from the farm. In total

exports Canada compares well with the U. S. ; for every inhabitant the U. S. export \$14 worth of produce, while Canada exports \$17 worth ; but while the U. S. export \$10 worth of farm produce for every inhabitant Canada exports only \$8 worth. To show how the development of one industry has been brought about by special encouragement we may here notice that in 1891 cheese was exported from the United States to the value of \$7,405,376, from Canada to the value of \$9,508,800, whereas in 1881 the United States exported \$16,380,248 and Canada \$5,510,443 worth of the same article. The necessity of imparting instruction in butter making will be seen at once, from the fact that in 1881 our Canadian butter exports amounted to \$3,573,034, but fell off steadily until in 1889 they reached only \$331,958. They are now moving up again, and in 1891 amounted to \$602,175. Particular attention has been paid during the past year to giving instruction and in spreading information in regard to butter making. Among other agencies the three Travelling Dairies, under the Ontario Department of Agriculture, may be specially mentioned, also the Provincial Dairy Associations.

The following statement of Canadian exports may be interesting in this connection :

	1872-1881.	1882-1891.
Total domestic exports.....	\$716,608,314	\$835,235,717
Agricultural exports.	333,503,729	406,698,163

Let us now turn to one very important item in our productions and exports, viz., wheat. Canada is generally considered a great wheat producing country. The opening up of Manitoba and the Territories and Districts of the North-west will in the future probably justify the claim, but the history of Ontario at least would lead to the conclusion that we have not held our own. Robert Gourlay, in his "Statistics of Upper Canada," gathered in 1817, gave the average wheat production of Ontario as 21 bushels per acre, with the average of the London district as 23½ bushels per acre. The price in 1817 was 6s. per bushel, in 1820 3s. per bushel. Major Strickland a few years after records a production on his farm of 40 bushels per acre. Picken, in his work on the Canadas, 1832, quotes a report as follows : " We were told that from 25 to 30 bushels was the average produce of wheat per acre. A man upon Lake Simcoe assured me that he had 371 bushels from 7 acres." In the reports of fifty years ago frequent reference is found to productions of 25 and 30 bushels per acre, and occasionally to 40 and over. The fall wheat crop of 1891—25.7 bushels per acre—reminded farmers of olden times ; but the spring wheat of 1892—12.7 bushels per acre—and the average of 1882-92 of 15.4 bushels per acre, show a great falling off. Taking both spring and fall wheat into consideration,

the average production of 1882 to 1892 has been about 18 bushels per acre. In Ontario, therefore, instead of increasing the yield per acre we have decreased it.

A pamphlet descriptive of Western New York, "The Genesee Country," published in 1804, says of that region: "It is uncommonly favorable for wheat, of which from twenty to twenty-five bushels are generally raised to an acre; but it has been known to yield forty and frequently thirty bushels an acre, and the grain is generally large and of a good quality." At that time the best improved land to the west of the Genesee river sold from one and a-half to two dollars an acre, and wheat from 62 cents to \$1 per bushel. In 1891 New York produced 10,633,000 bushels of wheat upon 640,450 acres, or 17 bushels per acre. Great Britain's wheat crop averaged 26.89 bushels per acre in 1886, 31.97 in 1887, 27.97 in 1888, 29.89 in 1889 and 30.74 in 1890. France increased her average from 9.4 bushels in 1815 to 16.0 in 1875, and to 17.8 in 1884.

The following statement will show that our surplus production of wheat in Canada has not been so large as many believe. The table gives the imports for home consumption and the exports of domestic produce. In the twenty-two years, from 1870 to June 30th, 1891, our total surplus is shown to have been only 33,500,000 bushels:

—	Imports.	Exports.	Surplus.	Deficiency.
	bush.	bush.	bush.	bush.
1870.....	6,034,708	5,467,986	.....	566,722
1871.....	6,165,877	3,280,912	.....	2,884,965
1872.....	6,052,039	5,258,919	.....	793,120
1873.....	7,215,550	6,750,751	.....	464,799
1874.....	9,845,896	9,282,802	.....	563,094
1875.....	7,444,088	5,896,937	.....	1,547,151
1876.....	7,736,226	8,147,913	411,687	.....
1877.....	7,334,366	3,736,180	.....	3,598,186
1878.....	7,208,011	6,775,690	.....	432,321
1879.....	5,775,605	9,485,594	3,709,989	.....
1880.....	519,171	7,813,460	7,294,289	.....
1881.....	1,064,557	4,722,313	3,657,756	.....
1882.....	1,208,494	6,193,730	4,985,236	.....
1883.....	1,368,877	8,312,688	6,943,811	.....
1884.....	2,954,600	1,732,471	.....	1,222,129
1885.....	3,073,641	2,959,841	.....	113,800
1886.....	1,072,719	5,349,663	4,266,944	.....
1887.....	870,685	8,232,791	7,362,106	.....
1888.....	324,452	3,914,329	3,599,877	.....
1889.....	1,179,825	1,081,219	.....	98,606
1890.....	953,344	940,219	.....	13,125
1891.....	406,222	3,443,744	3,037,522	.....

It is asserted by many that Ontario produces her 27,000,000 bushels of wheat at a loss, when wheat sells at less than \$1 per

bushel. If so, the remedy is to increase the yield per acre or to decrease the acreage. Every bushel per acre of increase would mean a total increase of 1,500,000 bushels. This surely is worth striving for, and the way to obtain success lies as follows: Improvement of the land by drainage and thorough cultivation, cleaning from weeds, increased fertilizing, and improved varieties of seed. Instruction in these various branches should help on the good cause.

I have thus far dealt with the first question, should agriculture be taught in our Public Schools? I have shown that the large majority of the people are intimately associated with rural work; and further, that the tendency to remove from this work and its surroundings is proceeding at too rapid a pace in this young agricultural country, and further, that the wealth and commerce of the country are greatly dependent upon agriculture. These points should conclusively prove that *agriculture should be taught if it can*.

II. CAN AGRICULTURE BE TAUGHT IN OUR PUBLIC SCHOOLS?

What has been done can be done. The various progressive countries of Europe are endeavoring to answer this question, each undertaking it according to the conditions of the people and the peculiarities of their situation. To France, however, we may turn as the most progressive and advanced of all civilized countries in the matter of agricultural education. France has a population of 38,095,156; her farms are the best cultivated in Europe, and her produce per head has increased by one-half in the past quarter of a century. "The capital represented by agriculture is at present double what it was in the year 1815, and nearly 40 per cent. of the wealth of the nation." (Mulhall.) The Budget of the Minister of Agriculture for 1891-2 provided \$850,000 for special agricultural instruction in institutions devoted to agriculture alone. First there is at Paris the Institut Agronomique, the Agricultural University, famous the world over for its investigations; then come three National Schools of Agriculture, one of Horticulture, one of Dairying, three of Veterinary Science, two of Forestry and two Shepherds' Schools. To the above \$481,000 was granted. In addition a Professor of Agriculture for each of the 86 Departments of France, Farm Schools, Apprentice Schools, Experimental Stations, Fields and Colonies, and Agricultural Orphanages subsidized to the extent of \$369,000.

The public school work of France may be summarized as follows:

The Infant Schools, 5158 in number, situated principally in the towns, are for children under seven years of age. The Elementary Primary Schools for pupils from seven to thirteen years, 80,000 in number, are scattered through the 36,000 communes. Above these are 483 Superior Primary Schools, corresponding to our High Schools, for pupils from thirteen to fifteen years, having

28,000 in attendance. In addition there are 265 Cours Complémentaires, attended by 14,000 pupils. The total enrolment for the Primary Schools is over 5,500,000, and the number of teachers is 141,000. The teachers for the Primary Schools are trained in Normal Schools, which number 160, and have an attendance of 9,000 teachers in training. The total cost of the elementary education to State, Departments and Communes in 1890 was \$40,000,000.

In 1850 Agriculture was made optional in public schools, and until 1879 instruction was dependent largely upon the encouragement of agricultural societies and private benefactors. In 1879, however, a law was passed compelling every Normal College within six years to provide agricultural instruction for the teachers-in-training, and further requiring the primary schools within three years thereafter to make Agriculture a compulsory subject in their course of instruction.

The introduction of agriculture, therefore, began with the training of the teachers—a step certainly worthy of imitation. The instruction in that subject is given by the Professors of Agriculture, one of whom is placed by the Government over each of the 86 Departments of France. Their salaries are paid one-half by the Minister of Education and one-half by the Minister of Agriculture. Their duties are three-fold: to give instruction to the teachers-in-training, to hold conferences with the farmers, and to carry out any investigations suggested by the Government. Gardens are attached to these Normal Schools.

The following is laid down for the general guidance of the teacher of the Primary School, but the teacher is free to adapt it to his own taste and the agricultural nature of the locality.

Infant Section. (5 to 7 years.) Object lessons and drawing.

Elementary Course. (7 to 9 years.) Lessons in the school garden.

Middle Course (9 to 11 years.) Instruction in connection with reading, object lessons and excursions, on the principal kinds of manures, agricultural work, and instruments of husbandry.

Superior Course. (11 to 13 years.) More methodical information on agricultural operations; the implements of husbandry, drainage; natural and artificial manures; seed sowing, harvesting; domestic animals; farm accounts; principal processes of propagating the most useful vegetables grown in the district; tree cultivation; the most important graftings.

Many of the schools have small gardens attached, and have agricultural museums. The teacher is encouraged in many Departments by prizes offered by the agricultural societies, and the work is supplemented by visits to first-class farms, dairies and establishments where agricultural products are being handled.

The teaching of Agriculture in the superior primary schools is of a more advanced nature, and is more frequently met with. Prof. Teegan thus refers to it: "The course extends over two years. It includes for boys practical ideas of vegetation, the different means of reproduction, the nature of different soils, manures, the principal agricultural machines, planting, transplanting, irrigation, the principal kinds of cultivation followed in France, and particularly the agricultural productions of the district in which the school is situated; diseases of plants and their prevention; weeds, vegetables, fruits, flowers, greenhouses, the cultivation of fruit trees; domestic animals; book-keeping, etc. The agricultural instruction is based on this general programme, but varied and extended to suit the needs of the locality. The practical illustrations are to be given in the school gardens and experimental fields, and during visits paid to the farms of the surrounding districts. In some of these institutions there is a special agricultural section, under the charge of a special Professor. The number of such schools is, however, small."

Fuller information in regard to the educational system of France may be obtained from two valuable works by Prof. T. H. Teegan, of the Board of National Education, Dublin, entitled "Elementary Education in France" and "Technical and Industrial Education in France," 1891, Simpkin, Marshall & Co., London, publishers.

The conclusions arrived at from a study of the above works, also the Reports of the British Board of Agriculture, 1891, are:

1. France has found it advisable to supplement the work of her Agricultural Colleges by introducing Agriculture as a special study into her general school system.

2. The work has been begun by training the teachers first, and while general methods have been prescribed the system is sufficiently elastic to meet the varying abilities of teachers and pupils.

3. The work is as yet in only the first stage of development, and although all the rural children of France have not been reached and the end aimed at has not yet been attained, the success achieved is very encouraging, and worthy of imitation by other nations.

An interesting article on "Village Life in France and England," by an Englishman, Rev. W. Tuckwell, appeared in the *Contemporary Review*, January, 1892, which showed the great advance which France had made, and how large a place the little school garden plays in the Republic. A few quotations will not be out of place:

"In the French post-office savings banks there are 2,800,000,000 francs (\$600,000,000) in 6,500,000 deposits."

"In these small farms, as in all the other holdings we had seen, the farming was extraordinarily skilful. Not only was the land far cleaner than most farmers' land in England—allotments at home had

accustomed me to that—but we were arrested by the dexterous economy in laying out the crops, the unexpected rotations, the use of chemical manures. This was due, we were told, to the Government Agricultural Colleges; and one of these we visited." Then follows a description which ends with this sentence: "No wonder French holdings, large or small, are scientifically farmed."

A short sketch of one of the market gardens near Paris is given. It was $2\frac{1}{2}$ acres in extent, the rental was £35 per acre, 15 men were employed and the yearly statement was as follows: Sales of produce £2,728; expenditure, wages, £1,000; rent and taxes, £100; interest on capital, £150; horses and carts, £100; sundries, £50; profit, £1,028.

Mr. Tuckwell concluded his article with this remarkable statement: "In England the owners of estates above one acre in size are about 300,000; in France they are 7,000,000. In England the average extent of a single farm is 390 acres; in France 10 acres, 4,000,000 owners holding properties of two acres, while the farms of 200 acres are so few that they can be counted on the fingers. In France there are 8,000,000 acres of common land, the exact amount which has in England been robbed from the laborers by successive Enclosure Acts during the last 170 years. In 1890 France exported £27,000,000 worth of food; England imported £80,000,000 worth. In sixty years 8,500,000 emigrants have left England; less than 500,000 have left France. In England the rural population is 33 per cent. of the whole; in France upwards of 75 per cent. In England, finally, the peasant is miserably housed, underpaid, servile, despairing; in France he is decent, well-to-do, independent, hopeful."

It may not be advisable to follow the lead of France in all particulars, but her experience certainly warrants the conclusion that the education of the rural classes in their own work is very beneficial. The imparting of a little agricultural information in public schools would doubtless have a good effect upon the attendance at our Agricultural College, and possibly create a necessity for increasing such facilities. The agricultural colleges have in all countries had to do too much begging for students, while at the same time schools of law, medicine, dentistry, pharmacy and technology have been overcrowded. The U. S. schools of Agriculture are also schools for training teachers, and for giving instructions in manual arts and in commercial courses. Many of these institutions, to obtain students for their agricultural departments, have been compelled to rely almost entirely upon "short courses" of six weeks or two months. Prof. Lazenby, of Ohio, in *The Cultivator and Country Gentleman* for November 17, 1892, has an article upon "Agricultural Education in Ireland." He describes the agricultural college at Glasnevin, near Dublin, and concludes thus: "In many respects it comes nearer to

my ideal of an agricultural college than any other institution I have yet seen. It teaches the young men and young women of Ireland—those who expect to live on farms—just what they most need to know. The expense is slight, the benefits great, and yet the number of students is small. Agricultural education is no more popular in Ireland than it is in the United States."

Our success in Ontario has been more marked. The Agricultural College at Guelph teaches nothing but agriculture and the subjects connected with agriculture, and this year it is filled to its utmost capacity; provision has been further made for an additional short course in dairying during 1892 and the applications are greatly in excess of the accommodation. But although we have surpassed many other countries in this work 110 or 150 students in agriculture are too few to come annually from the 70,000 youths, 15 to 21 years, who are living in the rural parts. Agricultural instruction in public schools might very materially increase the number of those who are desirous of thorough agricultural instruction.

III. HOW CAN AGRICULTURE BE TAUGHT IN THE PUBLIC SCHOOLS?

Upon this question hangs the whole difficulty. All are now agreed, I believe, that agriculture should be taught if it can, and many who have studied the subject are quite satisfied that it can be taught in some form; but when we come to the discussion of the point as to how it is to be taught much difficulty arises from the variety and conflict of opinions.

There are a few general statements that I would make in introduction to this part:

1. All, or nearly all, depends upon the teacher. To one interested in the progress of agriculture, informed upon the principles of the sciences involved, acquainted with rational methods of teaching, and fully determined to impart agricultural instruction, the entire difficulty is easily settled. But in the case of teachers who have been brought up in cities and towns, who are unacquainted with agricultural work, who have no bias towards agriculture, and who may be merely making the teaching a convenience for a couple of years whereby to earn a little money, the difficulty may be well nigh insurmountable, and there is absolute necessity that some training and direction be given before the work is undertaken; otherwise it were better to leave it alone entirely.

2. Trustees desiring agriculture to be taught in their schools must insist upon its being taught, and must be willing to assist in providing whatever means may be necessary. It may even be found advisable to grant a bonus to teachers who are competent to give instructions in this branch, especially if they have to incur increased

expense in fitting themselves for such work. Charts may be required ; some agricultural papers may be found helpful, but the entire outlay need not be very large.

3. Too much should not be attempted at first. The work should be introduced gradually, and the understanding at the outset should be very definite that by teaching agriculture in the public schools it is not intended to teach how to plow, how to harvest, or how to feed stock, but rather the why and the wherefore and to arouse an interest in agricultural operations.

4. The principal aim and object of instruction in our public schools should be the creation of a sentiment in favor of agricultural work, the gradual development of a love for the country and its healthful life, the arousing of a noble ambition in the young minds to become progressive and successful agriculturists, the spreading abroad of the idea that the industrious, thoughtful, honest farmer is the most valuable citizen of this Canada of ours—a man to be respected, appreciated and honored by every member of the community.

Prof. Calvin Thomas, in *The Open Court*, said in regard to the tendency of boys to leave the farm: "It begins to be borne in upon him in early boyhood that the life of the farm is a narrow, monotonous life of hard work, small pay, and meagre opportunity for action, enjoyment or improvement. He goes to the city in search of a better opportunity. Doubtless it would be better for him in most cases to remain upon the farm, but he does not know that until experience has taught him. He knows from books or from hearsay of men who have left the farm and found fame, money or excitement in the city. He knows nothing of the countless failures that he has not heard of. He feels himself drawn away. The more knowledge you give him, knowledge which tells of an outside world in which men are doing, studying, finding out all sorts of interesting things, the more you add fuel to the flame. I conclude, therefore, that very little can be done by the common schools to check the drift towards the cities. For this we must rely chiefly upon economic forces. Whatever tends to improve the economic status of the farm industry and to elevate the plane of the farmer's life will tend to correct the evil. What little the schools can do can best be done, in my opinion, by ethical rather than by scientific instruction. For it is a question of character rather than of knowledge that we are here concerned with, and it is the character building studies which I should wish to see compose the burden of early education."

In an article replying to the above Mr. E. P. Powell said: "I will not go on to discuss the Professor's interpretation of the German 'World-Thirst' which in his opinion is an instinct drawing boys and girls away from the farm. If such an instinct be in humanity, it

has been created like all other instincts and should be counterbalanced and corrected by education. We have many other drifts of like nature, such as the migratory instinct which antagonizes home-building." To the former's statement that increase of knowledge but adds fuel to the flame, Mr. Powell replies: "We shall both insist on showing the boy a world *at home* full of interest, of beauty, of thought, of study, of doing."

Thus there are two sides to agricultural education. In addition to imparting knowledge or teaching the student how to observe and how to think there should be a cultivation of the feeling, the sentiment. Who can tell what results unforeseen might flow from attending to a few improvements in the surroundings. Let the trustees put a neat fence about the little school yard, hang a simple but attractive gate, drain the play-ground, level it, sod or sow to grass, erect out-buildings at least suggestive of humanity, brighten up the interior of the school room with fresh paint. Then let them provide the schools with a few dollars to procure some neat charts and pictures dealing with rural life. In one corner have a cupboard to be filled with books and reports upon agriculture; fit up a couple of glass museum cases. Now let the teachers encourage the pupils in the setting out of native shrubs and trees about the grounds and the growing of a few plants inside and outside. Let the teachers and pupils make a collection of the weeds, the wild flowers, the grasses, the grains, the soils and rocks, and the insects injurious and non-injurious of the section, and arrange them in the cases. If possible, let them secure a few large views of the best farms and farm buildings and farm stock, and the Agricultural College, and hang them upon the walls. Thus one addition would suggest another and the dull, dreary, repulsive surroundings of many rural public schools might be changed to bright, cheery attractions that would bind together inseparably the two conceptions—rural life and pleasure. It may be that the condition of the rural school has been the repelling force to send many a boy to the town and city, and may we not expect that the improvement of surroundings would have some effect in binding the young men to the life and work of the country?

Apart from the teaching of agriculture as a separate subject there are subjects now included in the curriculum of our public schools that can be given a turn toward or an application to agriculture, and the subject thereby be indirectly introduced.

READING —In 1888 a commission was appointed in France to consider the working of their new system, and to suggest methods whereby the teaching of agriculture in French schools might be further developed. One of the most important suggestions that they made was that the literature placed in the hands of the pupils for reading and study should apply more than it had in the past to the country, the

description of rural scenery, of rural occupations and rural life. Prof. Teegan, in the work on Technical Education, previously noticed, refers to this feature in addition to other instruction :

"The vast majority of those whose school life ends with the primary school are destined to be engaged in some branch or other of productive industry—occupations in which manual skill is of primary importance. And yet we frame for these, to the exclusion of more useful studies, such courses of technical grammar as if their future destination were the senate, and such programmes in geography as if they were intended to lead exploring expeditions into the centre of Africa ; and the last instruction which it has entered into our heads to give them is that which they will require in their every-day life from the very hour they issue from the school, namely, manual training. Can we not so adapt the course of the primary school that knowledge of a more practical character—knowledge that will be more directly concerned with the future life of the scholars, may be imparted therein, without interfering with the efficiency of the school in the discharging of the primary function of education—namely mental development? It will, we think, be pretty readily admitted that the art of reading can be acquired as effectively through the medium of text-books, containing a series of lessons on the cultivation of fruit trees as through a series containing disquisitions on the oratory of Burke or the poetry of Homer. And surely the teaching of practical school gardening would be as valuable as setting the scholars to commit to memory the heights of the principal peaks of the Rocky Mountains."

ARITHMETIC.—Not a single question need be given in this subject that has not a bearing upon agriculture. We might refer to questions in marketing ; in the measurements of fields and roads ; as to capacity of barns, bins, silos, etc. ; as to the cost of production ; as to road-making.

DRAWING.—The flowers of the field, the weeds by the roadside, the simplest farm implements, the buildings and animals upon the farm surely afford scope for the most advanced artistic development to be found in rural schools.

BRITISH HISTORY.—The development of the agriculture of Britain should form as prominent a part of her history as does the development of her other industries. No more interesting chapters are to be found than those dealing with the early holdings of land and the method of working it. The history of the hundred acre farm of the present day from the old systems of ownership would be peculiarly adapted to senior rural pupils. Prof. C. K. Adams summarized the conditions of ownership four centuries ago in an address to the farmers of New York State thus : "Under the

Anglo-Saxons there seem to have been three general methods of holding land. There was first of all the demesne lord who resided in the centre of the territory, over which he had more or less control. He had a large estate immediately about him that was under his definite and positive government. This estate was by the Anglo-Saxon known as a *tun*, and that word is the origin of our word "town." The town was gradually gathered about this estate. In the second place, at a distance from this, were those who owed allegiance to the demesne lord, but who held the lands by feudal tenure, and paid for the rent of lands by manual services or the services of cattle. These husbandmen sometimes had control, absolute control, of the little land on which they lived, and so long as they fulfilled the conditions their control continued. Then, in the third place, there was the common territory that was used by all of the members of society. This common territory was partly pasture and partly farm lands. The farm lands were cultivated ordinarily in ridges, the land being thus thrown up for better draining. These ridges were nearly uniform in size, and were often known as ranges. They were given out by lot, each person drawing by lot once a year one of these pieces of land. A man sometimes had one, sometimes a half dozen, and sometimes more. They were not necessarily contiguous. They were redistributed every year, and thus fell with some sort of equality to the peasantry of the country. This condition lasted down to about the beginning of the fifteenth century."

Rural pupils should be familiar with the name of Lord Townshend, who in 1730 abandoned politics and gave England her Norfolk rotation of crops, earning for himself the name of Turnip Townshend and the fame of reclaiming hundreds of thousands of acres of waste land ; with the name of Bakewell of Dishley, in Leicestershire (1725 to 1794) who gave England improved breeds of stock ; with that of Arthur Young (1741 to 1820), "one of the most enlightened and useful pioneers of agricultural improvement that the century produced" ; with that of Coke of Holkham, who raised the rental of his estate from £2,200 in 1776 to £20,000 in 1816 by his methods of improvement, and taught his neighbors how to do the same ; and with that of Smith of Deanston, who preached the gospel of good and thorough drainage, and backed it up by the results of his own practice (1834). Those who may desire to study the development of English agriculture will find much help in Prothero's "Pioneers and Progress of English Farming," (Longmans, Green & Co., 1888).

CANADIAN HISTORY.—The past century of progress in Ontario depended largely upon its agricultural development. The true history of this province has been worked out upon the farm, in clearing the forest, in reclaiming the swamp, in the construction of roads, in

the improvement of our stock and the development of our produce for market. Too often historians are more disposed to seek for history in the halls of legislature and the fields of bloody conflict, overlooking entirely the social development of the people. If our teaching of history did not refer almost exclusively to transactions carried on in cities and on the part of the professional classes, but gave its true place to the questions in which the rural life is intimately associated, there would be less concluding on the part of rural pupils that city life and city events alone "count" in this progressive age. How many can tell when improved stock was first introduced into Ontario, when improved machinery came in, and where it came from? In 1864 the first cheese factory was built in Ontario, in the county of Oxford, and by 1867 the system was fairly established in the east and the west of making cheese in co-operative factories instead of in the farm dairies. Let us see the results: To-day, twenty-eight years afterwards, there are in Ontario alone 838 factories in operation, producing annually 82,000,000 lb. of cheese, worth about \$8,000,000. The cheese exports of Canada are over 27 per cent. of the entire agricultural exports, and nearly 12 per cent. of the total exports. The growth of cheese exports since the introduction of the factory system may be seen from the following: In 1866, \$123,494; in 1871, \$1,109,906; in 1876, \$4,050,008; in 1881, \$5,510,443; in 1886, \$6,754,626; in 1891, \$9,508,800. There are two men who deserve a place in the history of this country, whose work has brought more wealth and prosperity to North America than many whose names fill a large place in the written history of our land—those two men are Jesse Williams, who conceived the idea of a cheese factory and built the first at Rome, N.Y., in 1851, and Harvey Farrington, who brought the idea from Herkimer County, N.Y., and set up the first Canadian factory near Norwich, Ontario, in 1864. Should not our rural pupils and our town and city pupils also be made acquainted with such men and their deeds? How many historians have acquainted their readers with the development of our agricultural fair system, from 1825, when the first society was formed in Ontario, to 1846, when the first Provincial Fair was held at Toronto, and from then to the present day. When school begins in September, and the County Fair is billed at all the cross-roads, might not the teacher interest the older pupils at least in this subject which has played no unimportant part in the development of the rural classes and increasing the wealth of Canada? It may be easier to interest pupils in the accounts of war and conquests than in the story of backwoods settlement and colonization roads, but the history contained in such works as the writings of Major Strickland and Mrs. Moody will produce as patriotic citizens as the story of the capture of Quebec or Queenston Heights.

There is here an unlimited field for instilling information and inspiring a taste for agriculture in rural pupils dependent upon the ability of the teacher, the taste for such work, and the resources at hand for obtaining such information.

COMPOSITION.—The history of agriculture in the past century, and the varied work of the present agricultural life, suggest a great variety of subjects that might be given in this department of school work. Let the teacher assign subjects to the pupils, giving the pupil a chance to show his or her preference in the choice. Let the pupils take the subjects home and gather information by enquiry and research. If only the spirit of curiosity and investigation can be aroused good results must follow. Out of a hundred and one subjects let us suggest a few :

1. The first settlement of this Township.
2. How are roads constructed ?
3. What is the system of road management and repair ?
4. The advantages of draining.
5. Why is corn planted in drills rather than broadcast ?
6. The use and value of ashes as a fertilizer.
7. Why is clover sometimes plowed under ?
8. The relation of bees to fruit.
9. The best method of destroying the codling-moth.
10. The principal birds of the district which should be protected.

AGRICULTURE.—Could not something further be done by way of simple interesting talks to the pupils on various subjects in agriculture suited to their age and understanding, and suggested by the agricultural nature of the district ? If the purpose of such instruction be carefully kept in mind, viz., to interest the pupils in matters pertaining to agriculture, and to instruct them to use their eyes to see what lies on all sides of them and to see correctly, it matters little what part of the immense field of agriculture be selected. As for the material about which to talk, and which might be brought right into the class, there is an "excess of riches." The roads upon which they come to school; or which so often keep them from coming to school; the weeds by the roadside and in the fence corners; the flowers, shrubs and trees beyond the fences; the soil of the fields and the different crops growing upon that soil; the insects and the birds which are in some cases so necessary and in others so destructive to the crops; the cheese factory that stands at the four corners; the fruits and the vegetables of the garden—these and other subjects will suggest, as the question is looked into, that the teacher will have to confine his instruction to but a small part of what is probably the

widest and most comprehensive science known to man—the science of agriculture. Let me here quote the opinion of a man who is recognized as an authority on the subject of education. Professor Huxley is quoted as speaking to an agricultural club in these words :

“There are some general principles which apply to all technical training. The first of these, I think, is that practice is to be learned only by practice. The farmer must be made by thorough farm work. I think I might be able to give you a fair account of a bean plant, and of the manner and condition of its growth ; but if I were to try to raise a crop of beans your club would probably laugh consumedly at the result. Nevertheless, I believe that practical people would be all the better for the scientific knowledge which does not enable me to grow beans. It would keep you from attempting hopeless experiments, and would enable you to take advantage of the innumerable hints which Dame Nature gives to the people who live in direct contact with things.”

“And this leads me to the general principle which I think applies to all technical training of school boys and school girls, and that is that they should be led from the observation of the commonest facts to general scientific truths. If I were called upon to frame a course of elementary instruction preparatory to agriculture, I am not sure that I would attempt chemistry, or botany, or physiology or geology as such. It is a method fraught with the danger of spending too much time and attention on abstraction and theories, on words and notions, instead of things. The history of a bean, of a grain of wheat, of a turnip, of a sheep, of a pig, or of a cow, properly treated—with the introduction of the elements of chemistry, physiology and so on as they come in—would give all the elementary science which is needed for the comprehension of the processes of agriculture, in a form easily assimilated by the youthful mind, which loathes anything in the shape of long words and abstract notions, and small blame to it.”

What I have suggested does not involve any upsetting or overturning of the present system of education, but rather an adaptation to agriculture as far as possible of subjects now upon the curriculum. Instruction in agriculture in our schools may be very limited, but if nothing more be done than to start our rural pupils thinking, to give them an impetus or a turn in the right direction, to develop in them a taste for agricultural study and investigation, to arouse in them a desire to know more and to read more about agricultural affairs, and especially to increase in them a respect for their work and a pride in their calling, then the most important end of their education will have been attained.